

Consanguinity in Kahramanmaras city, Turkey, and its medical impact

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ABSTRACT

Objectives: Recently, several studies have indicated the rate of consanguinity ranging between 20 and 70% in the Middle East. Turkey is one of the countries with a high rate of consanguineous unions in the Middle East. In this study, the rate of consanguinity and its effects on spontaneous abortus, stillbirth, infant mortality, and birth defects were investigated in a population sample residing in Kahramanmaras city, Turkey.

Methods: For this study, 1000 randomly selected women, aboriginals of Kahramanmaras city, Turkey, were interviewed at their home and the concerning information was obtained by administration of a questionnaire between April 2002 and March 2003.

Results: The prevalence of consanguinity was found to be 30.6% with the mean inbreeding coefficient of 0.015373. The most common type of consanguineous mating was first cousin marriages with the frequency of

22.6%. The family pressure and love were the main reasons for marrying with a relative. The mean age at marriage of women and men were lower in consanguineous marriages than that of non-consanguineous unions. There was a negative correlation between the consanguinity and educational level of both sexes. The results revealed differences between consanguineous and non-consanguineous matings, in terms of stillbirth, infant mortality and birth defects whereas the rate of spontaneous abortus was found to be the same in 2 kinds of marriages.

Conclusion: The incidence of consanguinity and of first cousin marriages is found to be very high in the Kahramanmaras city. A reduction of consanguinity rate is necessary for the health quality of the population.

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The marriage with a relative is related to the health quality of society as well as a genetic concept. Consanguinity is generally not common in Western populations, whereas it is prevalent in many regions of Asia, Africa and India due to socioeconomic, ethnic, cultural and religious factors. Studies indicated that the rate of consanguinity range from 20 to more than 70% in Muslim populations of the Middle East.^{1,2} Turkey is one of the countries in the Middle East Asia with the high rate of consanguineous matings. The results of the several studies from different regions of Turkey indicated the consanguinity range from 11%

in the most developed western regions to 46% in the least developed eastern regions.³⁻⁵ The rate of consanguinity is predicted to be high in Kahramanmaras city, located in the east Mediterranean region of Turkey. It has an estimated population of 332.100 with 114.773 families in 2001 and a semi conservative young age structure. Kahramanmaras underwent industrial development later than other Mediterranean cities. Its economy depends on agriculture as in the other cities of Turkey especially on fabric and yarn; and the gold industry. No literature data could be available on

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the rate of consanguinity in Kahramanmaras city, therefore, this study was undertaken to assess the prevalence and types of consanguinity and its association with age at marriage, educational level of mates, spontaneous abortus, stillbirth, infant mortality, and birth defects in Kahramanmaras city of Turkey.

Methods. For the study, a population sample consisting of randomly selected 1000 women, aboriginals of Kahramanmaras, at different ages (15-30) and socioeconomic standards were interviewed at their home between April 2002 and March 2003.

The information concerning the age at first marriage, educational levels of couples, relation with husband, and reasons of the consanguinity were obtained by questionnaire administration. In addition, the number of spontaneous abortus, stillbirth, infant mortality and of the children with birth defects (physically or mentally) were recorded for the investigation of effects of consanguinity.

The data analysis was carried out using SPSSX statistical package. The mean inbreeding coefficient was estimated according to formula $i = C_i F_i / N$, where i is the degree of consanguinity, C is the frequency of consanguineous unions of degree i , and F is inbreeding coefficient of degree i (for first cousins $F=0.0625$ and for second cousins $F=0.0156$) in the sample population.

Results. The prevalence of consanguineous marriages was 30.6% in Kahramanmaras with the mean inbreeding coefficient of 0.015373. The types of consanguinity were first cousin (22.6%) and second cousin marriages (8%). In this population sample, the main reasons for consanguinity were family pressure (64%), love (30%), and socio-economic factors (5.6%).

In consanguineous unions, the mean age at first marriage was 18.66 ± 0.165 years for women and 22.85 ± 0.191 for men. These values were 19.37 ± 0.124 for women and 24.14 ± 0.131 for men in non-consanguinity. The mean age at first marriage of both women ($p<0.01$) and men ($p<0.001$) in consanguinity was significantly lower than those of non-consanguinity. **Table 1** presents the educational levels of women and men in 2 types of marriages. Consanguineous marriage was more frequent in women (52.6%) and man (37.2%) who had elementary school education. As shown in **Table 1**, the prevalence of consanguinity was decreasing with the level of education and there was a negative correlation between consanguinity and educational level of both women ($p<0.001$) and men ($p<0.001$).

The results from consanguineous and non-consanguineous marriages concerning the spontaneous abortus, stillbirth, infant mortality, and birth defects are given in **Table 2**. The frequency of spontaneous abortus was observed as 12.1% in consanguinity and 11% in non-consanguinity. This difference was not significant ($p>0.01$). The rate of stillbirth was 5.5% in consanguineous unions. This rate was 3.4% in non-consanguineous unions. The frequency of stillbirth was significantly higher in consanguineous marriages ($p<0.01$). Infant mortality rate in consanguinity was 7.3% and in non-consanguinity it was 3.7%. It was a 2-fold higher in consanguinity than non-consanguinity ($p<0.01$). As shown in **Table 2** the rate of children with birth defects (physically and mentally) was 7% in consanguineous marriages and 1.4% in non-consanguineous marriages. It is significantly 5-fold higher in the children of consanguineous marriages than those of non-consanguineous marriages.

Table 1 - The educational levels of women and men.

Level of education	Women		Men	
	Consanguinity N (%)	Non-consanguinity N (%)	Consanguinity N (%)	Non-consanguinity N (%)
Literate	62 (20.3)	106 (15.3)	13 (4.3)	22 (3.2)
Elementary	161 (52.6)	311 (44.8)	114 (37.2)	210 (30.3)
Secondary	35 (12.1)	95 (13.7)	70 (22.9)	98 (14.1)
High school	36 (11.1)	108 (15.6)	59 (19.3)	186 (26.8)
University	12 (3.9)	74 (10.6)	50 (16.3)	178 (25.6)
Total	306 (100)	694 (100)	306 (100)	694 (100)
Women $\chi^2 = 20.06$, df = 4, $p<0.001$, Men $\chi^2 = 26.57$, df = 4, $p<0.001$				

Table 2 - The comparison of the results from consanguineous and non-consanguineous marriages.

Medical impact	Type of consanguinity		Total consanguinity	Non-consanguinity	Total
	1st cousin	2nd cousin			
Spontaneous abortion					
Total pregnancy	928	267	1195	2116	3311
Spontaneous abortus	123	22	145	232	377
			$\chi^2 = 0.82$ df = 1	$p > 0.01$	
Still-birth					
Total normal birth	763	232	995	1822	2817
Stillbirth	42	13	55	62	117
			$\chi^2 = 6.68$ df = 1	$p < 0.01$	
Infant mortality					
Child alive more than 1 year	705	222	927	1757	2684
Infant mortality	58	10	68	65	133
			$\chi^2 = 15.27$ df = 1	$p < 0.01$	
Birth defects					
Total normal children	652	214	866	1733	2599
Children with birth defects	53	8	61	24	85
			$\chi^2 = 53.80$ df = 1	$p < 0.01$	

DISCUSSION. The incidence of consanguinity in Kahramanmaras city, localized in the east Mediterranean region of Turkey, was found to be 30.6% with a mean inbreeding coefficient of 0.015373. Ulusoy and Tuncbilek⁶ reported the mean rate of consanguinity to be 23.1% in Turkey and stated that there were regional differences, which was 31% in the Mediterranean region, southern Turkey. The prevalence of consanguinity in Antalya city, west Mediterranean region, reported to be 28.3% by Guz et al.⁷ In another study⁸ conducted in Manavgat, Turkey, the consanguinity rate was stated as 24.2%.

The present findings of a rate of consanguineous marriages, 30.6% for Kahramanmaras city is higher than those found for both Antalya and Manavgat and the mean consanguinity rate for Turkey (23.1%). These results are possibly due to strong adherence to traditions, semi-conservative population and less development of Kahramanmaras city. On the other hand, the consanguinity rate of Kahramanmaras population is similar to the mean value of the southern part of Turkey.

The mean inbreeding coefficient of 0.015373 is one of the highest values reported for the cities of Turkey mainly due to high prevalence of first cousin marriages in Kahramanmaras. In this study, it was shown that the most frequent type of consanguinity was first cousin marriages with the frequency of 22.6%, followed by second cousin marriages, 8% of the total marriages. In all populations strongly practicing consanguineous marriages, first cousin unions are traditionally preferred types of consanguinity. The family pressure and the love were shown to be the main reasons for consanguinity with the frequencies of 64% and

30.4% respectively. The socioeconomic factors, which accounted for 5.6% were the least prevalent reason of consanguinity in this population sample.

The mean age at first marriage of women was 18.66 ± 0.165 years and for men it was 22.85 ± 0.191 years in consanguineous marriages. These values were significantly lower than women, 19.37 ± 0.124 years ($p < 0.01$), and men, 24.14 ± 0.131 years ($p < 0.001$), in non-consanguineous unions. These findings are consistent with the results of Simsek et al.,⁹ Sivaram et al.,¹⁰ and Afzal et al.,¹¹ but are not in agreement with the findings of Guz et al.⁷ and Hussain and Bittles.¹²

It is shown in **Table 1** that consanguinity was more common in women with the frequencies of 52.6% and men 37.2% who had completed elementary school. These values were decreasing with the level of education. This study confirmed the negative correlation between the consanguinity and educational level of both women ($p < 0.001$) and men ($p < 0.001$). Several studies have indicated the importance of education on reducing the consanguineous matings.^{7,12,13}

The results of the studies concerning the effects of consanguinity on spontaneous abortus, stillbirth and infant mortality have been controversial. In this population sample, the spontaneous abortus was found to be 12.1% in consanguinity and 11% in non-consanguineous unions. There was no significant difference between abortion rate of 2 kinds of marriages ($p > 0.01$) (**Table 2**) as in the studies of Demirel et al.,¹⁴ Asha et al.,¹⁵ Hussain and Bunyan,¹⁶ and Khoury and Massad.¹⁷ However, Guz et al.,⁷ Tuzun and Elyas,¹⁸ Budak et al.,¹⁹ and Baki et al.²⁰ reported significantly higher rates of abortus in consanguineous mothers.

The frequency of stillbirth in consanguinity was found to be 5.5% and in unrelated marriages it was 3.4%. Consanguineous marriages showed significantly higher rate of stillbirth ($p<0.01$) (Table 2). These findings are in accord with the results of previous studies conducted in different populations^{7,17,18,21,22} but are not in agreement with the study of Demirel et al¹⁴ and Asha et al.¹⁵

The rate of infant mortality in consanguinity, 7.3%, was observed twice as many as the non-consanguinity, 3.7%. It is significantly higher in consanguineous unions ($p<0.01$) (Table 2) as in the several studies.^{7,9,11,15,17,18} Tuncbilek and Koc,⁶ stated first cousin marriage is a significant determinant underlying infant mortality rate in Turkey. Various socioeconomic and demographic factors can also affect infant mortality. However, Grant and Bittles²³ stated that even after controlling these factors, neonatal, postneonatal and infant mortality were statistically high in first cousin unions.

The prevalence of children with birth defects (physically or mentally) was estimated a 7% in consanguinity and 1.4% in unrelated marriages. The rate of birth defects was approximately 5-fold higher in consanguineous than non-consanguineous unions ($0.00<0.01$) (Table 2). Various studies reported substantially higher risk for birth defects in the offspring of first cousin parents than those of non-consanguineous parents.^{14,15,17,18,22,24}

The rate of consanguinity and of first cousin marriages was found to be very high in Kahramanmaras city. In addition, the rate of stillbirth, infant mortality and of birth defects was observed to be significantly high in consanguineous unions. The results of this study showed that consanguinity is a serious problem for the health quality of Kahramanmaras population. General education of society on disadvantages of consanguinity and genetic counseling will be helpful in reducing the first cousin marriages.

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References

- Jaber L, Halpern GH, Shohat M. The impact of consanguinity worldwide. *Community Genet* 1998; 1: 12-17.
- Bittles A. Consanguinity and its relevance to clinical genetics. *Clin Genet* 2001; 21: 89-98.
- Basaran N, Sayli BS, Basaran A, Solak M, Artan S, Stevenson JD. Consanguineous marriages in the Turkish population. *Clin Genet* 1988; 34: 339-341.
- Tuncbilek E, Ulusoy M. Türkiye'de akraba evliliği. *Nufusbilim Dergisi* 1989; 11: 35-46.
- Tuncbilek E, Koc I. Consanguineous marriage in Turkey and its impact on fertility and mortality. *Ann Hum Genet* 1994; 58: 321-329.
- Ulusoy M, Tuncbilek E. Türkiye'de akraba evlilikleri ve çocuk olumlarına etkisi. *Nufusbilim Dergisi* 1987; 9: 7-26.
- Guz K, Dedeoglu N, Luleci G. The frequency and medical effects of consanguineous marriages in Antalya, Turkey. *Hereditas* 1989; 111: 79-83.
- Alper OM, Erengin H, Manguoglu AE, Bilgen T, Cetin Z, Dedeoglu N, et al. Consanguineous marriages in the province of Antalya, Turkey. *Ann Genet* 2004; 47: 129-138.
- Simsek S, Ture M, Tugrul B, Mercan N, Ture H, Akdag B. Consanguineous marriages in Denizli, Turkey. *Ann Hum Biol* 1999; 26: 489-491.
- Sivaram M, Richard J, Rao PS. Early marriage among rural and urban females of South India. *J Biosoc Sci* 1995; 27:325-331.
- Afzal M, Ali SM, Siyal HB. Consanguineous marriages in Pakistan. *Pak Dev Rev* 1994; 33: 663-674.
- Hussain R, Bittles AH. Sociodemographic correlates of consanguineous marriage in the Muslim population of India. *J Biosoc Sci* 2000; 32: 433-442.
- Hussain R, Bittles AH. The prevalence and demographic characteristics of consanguineous marriages in Pakistan. *J Biosoc Sci* 1998; 30: 261-275.
- Demirel S, Kaplanoglu N, Acar A, Bodur S, Paydak F. The frequency of consanguinity in Konya, Turkey and its medical effects. *Genet Couns* 1997; 8: 295-301.
- Asha BPV, John TJ, Subramaniam VR. Reproductive wastage and developmental disorders in relation to consanguinity in South India. *Trop Geogr Med* 1981; 33: 275-280.
- Hussain M, Bunyan M. Consanguineous marriages in a Saudi population and the effect of inbreeding on prenatal and postnatal mortality. *Ann Trop Paediatr* 1997; 17: 155-160.
- Khoury SA, Massad DF. Consanguinity, fertility, reproductive wastage, infant mortality and congenital malformations in Jordan. *Saudi Med J* 2000; 21: 150-154.
- Tuzun C, Elyas H. Elazığ ili merkez ve çevresinde akraba evlilikleri insidansı ve tıbbi sonuçları. *Fırat Tıp Dergisi* 1996; 1: 60-65.
- Budak T, Alp MN, Celik MY, Elbistan M. Kan yakını evliliklerinin Diyarbakır toplumundaki sıklığı ve bazı etkileri üzerine araştırmalar (I). *Diyarbakır Üniversitesi Tıp Fakültesi Dergisi* 1985; 12: 149-160.
- Baki A, Karaguzel A, Beser E, Cakmakci T, Ucar F, Omeroglu A. Consanguineous marriages in the province of Trabzon, Turkey. *East Afr Med J* 1992; 69: 94-96.
- Shami SA. Risk in consanguineous marriages: An isonymic study. *Pak Med Assoc* 1981; 31: 269-276.
- Magnus P, Berg K, Bjerkedal T. Association of parental consanguinity with decreased birth weight and increased rate of early death and congenital malformations. *Clin Genet* 1985; 28: 335-342.
- Grant JC, Bittles AH. The comparative role of consanguinity in infant and child mortality in Pakistan. *Ann Hum Genet* 1997; 61: 143-149.
- Stoll C, Alembik Y, Dott B, Feingold J. Parental consanguinity as a cause of increased incidence of birth defects in a study of 131,760 consecutive births. *Am J Med Genet* 1994; 49: 114-117.